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EXAMINER	
RUTHKOSKY, MARK	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 09/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/435,748	BUCKLEY ET AL.	
	Examiner	Art Unit	
	Mark Ruthkosky	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29-44,52-54 and 58-89* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *29-44,52-54 and 58-89* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

Claims 29-44, 52-54 and 58-89 are active in the application. The application has been remanded to the examiner because the application is not considered to be in a condition that permits an informed and meaningful appellate review. The remand paper was mailed to the applicant on August 26, 2005. The requests of the BPAI have been addressed in this office action. The examiner notes the content of the first full paragraph on page 5 of the Remand to the applicant. In the applicant's reply to the office action, a reasonably specific argument should be presented as discussed on page 5 of the remand.

Claim Rejections - 35 U.S.C. § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 29-44, 52-54 and claims 58-89 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The instant claims use the phrase "less than about." This phrase is indefinite as "less than" defines a lower limit, while the term "about" contradicts the value of the lower limit. As shown in the MPEP, section 2173.05(b), the phrase "at least about" is held as indefinite. The same reasoning is applied to the phrase, "less than

about." For example, if 15 mm is about 9.5, then all points less than 15 mm anticipate the claims.

Regarding claims 36, 38, 66 and 68, the word "derivative" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "derivatives"), thereby rendering the scope of the claim(s) unascertainable. The identity of the derivations of the electrode material is unclear and includes elements not actually disclosed. Thus, the scope of the claim(s) is unascertainable. As an example, lithium cobalt oxide is a claimed formula, however, lithium cobalt manganese oxide, which may be considered a derivative, is not disclosed.

The term "derivatives" is used in the claims to define very different electrode active materials. For example, claim 38 cites nine general compositions. These compositions are general and do not cite specific formulae. These compositions include molecules that are not limited to a specific molecular formula and encompass different concentrations of each atom. These materials are considered to be definite in scope. However, one possessing the ordinary level of skill in the pertinent art at the time the invention was made could not determine the scope of the invention with regard to derivatives of these materials with a reasonable degree of certainty. When the definiteness of the claim language is analyzed in light of the contents of the original application or disclosure, one determines that the disclosure merely repeats that the composition may include derivatives thereof. When the definiteness of the claim language is analyzed in light of the teachings of the prior art by one possessing the ordinary level of skill in the pertinent art at the time the invention was made, one determines that the scope cannot be determined. The word derivative renders the claim indefinite.

New Matter

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 29-44, 52-54, and 58-89 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amendment filed 4/21/2003 introduces new matter into the disclosure. The added material that is not supported by the original disclosure is as follows:

In claims 29-44, 52-54, 58-83 and 85, the average thickness of an electrode has been amended to be less than about 9.5 microns. There is no support in the specification for this specific point. The applicant has provided pages 50-51 as support for the change in the amendment; however, no support is found for "less than about 9.5 microns." The applicant has narrowed the claimed range in order to overcome the art of record, which teaches an electrode thickness range with an end point of 10 microns. The electrode thickness range of "less than about 10 microns" is supported by the original disclosure; however, the specification does not offer a range or point including the end point of less than about 9.5 microns. The point 9.5 microns is not supported anywhere in the reference and thus, the range encompassed by this point is new matter.

In claims 84-89, there is no support for a current collector average thickness of "less than about 4.5 microns." There is no support in the specification for this specific point. The applicant has provided pages 50-51 as support for the change in the amendment; however, no support is found for "less than about 4.5 microns." In the dependent claims, the range has been narrowed from less than about 5 microns to less than about 4.5 microns. Again, the application offers no support for a thickness range with 4.5 microns as an end point. The point 4.5 microns is not supported anywhere in the reference and thus, the range encompassed by this point is new matter. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 U.S.C. § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 29-33, 39, 53, 58-63, 69, 76, 84, and 85 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dansui et al. (US 6,033,805.)

The instant claims are to a battery comprising a positive electrode, a negative electrode and a separator between the positive and negative electrodes wherein at least one of the

electrodes has an average thickness of less than about 9.5 microns and comprises a powder comprising electroactive particles having an average diameter of less than about 500 nm.

Dansui et al. (US 6,033,805) teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. An electrode has an average thickness of less than about 10 microns. For example, column 3, lines 5-10 shows an electrode layer of 10-60 microns on a collector foil and claim 16 shows a layer of 10-60 microns on each side of the foil. Using the lower limit, 10 μm is interpreted to be "less than about" 9.5 μm. The electrode active material comprises a powder of cobalt hydroxide electroactive particles having an average diameter of less than about 200 nm (see example 2 and claim 15.) The current collectors and separators have a thickness of about 10 microns (see example 1.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles and is attached to a current collector (see the examples.) In this rejection, the phrase "less than about" is considered to include points above 9.5, including 10, due to the inclusion of the word "about." For example, when 15 μm is "about 9.5 μm", then all points taught in the reference less than 15 μm anticipate the claims. The current collectors and separators have a thickness of about 5-20 microns (see col. 3, lines 1-10 and 10 μm in example 1.) A value of 5 microns is considered to be "less than about" 4.5 microns due to the limitation "about." The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles and is attached to a current collector (see the examples.) Thus, the claims are anticipated.

If it is held that the phrase "less than about" is not considered to include points above 9.5, including 10 μm as taught in the reference, then it would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a battery having an electrode with an average thickness of less than about 9.5 μm in order to produce a smaller sized battery. One of ordinary skill in the art would recognize that changing the relative dimensions of the electrode to a smaller size would give a smaller battery for use in small devices that require less energy (See MPEP 2144.04(d). It is well established in the art that adding less active material to an electrode will give an electrode with less capacity. The applicant has established no criticality with regard to the thickness being less than 9.5 μm.

If it is held that the phrase "less than about" is not considered to include points above 4.5, including 5 μm as taught in the reference, then it would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a battery having current collectors and separators with an average thickness of less than about 4.5 μm in order to produce a smaller sized battery. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 78-83, and 86-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805.)

Dansui et al. (US 6,033,805) teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The electrode has an average thickness of less than about 10 microns. For example, column 3, lines 5-10 shows an electrode layer of 10-60 microns on a collector foil, and claim 16 shows a layer of 10-60 microns on each side of the foil. Using the lower limit, 10 μm on one or both sides of the foil (~20 μm) is interpreted to be "less than about" 9.5 μm. The active material comprises a powder comprises cobalt hydroxide electroactive particles having an average diameter of less than about 200 nm (see example 2 and claim 15.) The current collectors and separators have a thickness of about 10 microns (see example 1.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles, and is attached to a current collector (see the examples.)

Dansui et al. (US 6,033,805) does not teach the electrode to have an average thickness of less than about 5 microns, from 250 nm to 2.5 microns or from 300 nm to about 1 micron. It would be obvious to one of ordinary skill in the art at the time the invention was made to alter the thickness of the electrode as one of ordinary skill in the art would understand that adding more or less active material to an electrode will increase/decrease the capacity of the battery. One of ordinary skill in the art would alter the amount and therefore the size of the electrode in order to achieve a desired capacity for a battery. It would be evident to the skilled artesian to prepare electrodes having smaller thicknesses than the thicknesses taught in Dansui in the event of preparing a smaller battery requiring less capacity.

Further, the Dansui et al. (US 6,033,805) reference does not teach current collectors to have an average thickness of less than about 2.5 microns, or from 0.25 to about 1 micron. Again, it would be obvious to one of ordinary skill in the art at the time the invention was made to alter the thickness of the electrode current collector as one of ordinary skill in the art would understand the relationship between the size of the current collector and the conduction of the electrons through the current collector to and from the electrode. One of ordinary skill would understand that decreasing the size of the current collector would allow for the inclusion of more active material in a battery electrode and therefore a higher capacity or reduce the volume of collector material in a battery in order to provide a smaller battery. Further, one of ordinary skill in the art would recognize that electronic conduction through the current collector would require access to the collector in order from the active material in order to conduct electrons to and from the electrode. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claims 34, 35, 37, 38, 41, 42, 43, 44, 52, 54, 64, 65, 67, 68, 71, 72, 73, 74, 75, and 77 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805) in view of Satoh et al. (US 5,571,638.)

Dansui et al. (US 6,033,805) teaches battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The electrode has an average thickness of less than about 10 microns. For example, column 3, lines 5-10 shows an electrode layer of 10-60 microns on a collector foil, and claim 16 shows a layer of 10-60 microns on each side of the foil. Using the lower limit, 10 μm on one or both sides of the foil (~20 μm) is interpreted to be less than about 9.5 μm. The active material comprises a powder of

cobalt hydroxide electroactive particles having an average diameter of less than about 200 nm (see example 2 and claim 15.) The current collectors and separators have a thickness of about 10 microns (see example 1.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles, and is attached to a current collector (see the examples.) Dansui et al. (US 6,033,805) does not teach the specific electrode materials and current collectors described in the dependent claims of this rejection.

Satoh et al. (US 5,571,638), however, teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The active material comprises a powder comprises lithium transition metal oxide electroactive particles having an average diameter of less than about 500 nm (see example 2 and claim 15), a conductive powder and binder (see claims 1-10.) The anode material is a carbon powder with a size ranging from 10 nm to 50 micron (see the paragraph bridging cols. 3-4.) Current collectors of stainless steel, copper and aluminum are noted in col. 7, (lines 55+.) Polymer separators having a thickness of about 10 microns are noted (see example 8 and col. 8, lines 1-45.) The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with a binder and conductive particles, and is attached to a current collector (see the examples.)

It would be obvious to one skilled in the art at the time the invention was made to prepare materials with nanometer sized particles as these methods are taught in the art as described. Further, it would be obvious to prepare electrodes with various thicknesses as the small particle sizes will allow for electrodes with an average thickness of less than about 10 microns, as taught

in Dansui et al. (US 6,033,805.) One of ordinary skill in the art would have the knowledge to use the electrode materials of Satoh et al. (US 5,571,638) in a thin electrode battery as taught Dansui et al. (US 6,033,805) as it is clear that electrodes can be prepared with an average thickness of less than about 10 microns. In addition, one of ordinary skill in the art would have the knowledge to incorporate the thickness of the electrodes of Dansui et al. (US 6,033,805) into the thin battery of Satoh et al. (US 5,571,638) as the small particles with binders and conductive particles will allow for the production of a thin electrode. The use of various current collectors would be obvious as each are well known in the art to conduct current from an electrode material. One of ordinary skill in the art would recognize that changing the relative dimensions of the electrode to a smaller size would give a smaller battery for use in small devices that require less energy (See MPEP 2144.04(d). It is well established in the art that adding less active material to an electrode will give an electrode with less capacity. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638) are silent to the surface roughness of the separator, however, Satoh et al. (US 5,571,638) teaches the surface roughness of the current collectors to be 0.1-10 microns to increase bonding. It would be obvious to one skilled in the art at the time the invention was made to have materials in the electrode assembly with a surface roughness of 0.1-10 microns to increase the bonding of the materials. The current collector is bound to the active material in the same manner the separator is bound to the active material on the opposite side of active material. One of ordinary skill in the art would recognize that a surface roughness of 0.1-10 microns would increase the bonding and adherence of the materials in the electrode assembly.

With regard to claims 44 and 74, Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638) do not teach the electrode current collector to be made of graphite paper, however, it would be obvious to one of ordinary skill in the art at the time the invention was made to use graphite paper as a current collector in the batteries of Dansui et al. (US 6,033,805) and Satoh et al. (US 5,571,638.) Graphite is a well-described electron conductor as shown in the electrodes of both references. The electrode current collectors taught in the references are used to transfer electrons to and from the electrodes. One of ordinary skill would recognize that a graphite sheet or paper will provide the same means for transferring electrons to and from the electrodes as the metal sheets described in the references.

Claims 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 53, 64, 65, 66, 67, 68, 70, 71-73, 76, 77 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805) in view of Kawakami et al. (US 6,165,642.)

Dansui et al. (US 6,033,805) teaches a battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes as previously described. Dansui et al. (US 6,033,805) does not teach the specific electrode materials and current collectors described in the dependent claims of this rejection.

Kawakami et al. (US 6,165,642) teaches a rechargeable lithium battery comprising a positive electrode, a negative electrode and a polymer separator between the positive and negative electrodes. The electrode includes an active material comprising a powder of lithium transition metal oxide electroactive particles having an average diameter of less than about 500 nm (see examples 2-4 and claim 1), a conductive powder and binder (see claims 1-18 and examples 1-4.) The size distribution of the active material is between 0.5 to 50 nm in examples

2-4. The anode material may be a transition metal oxide, lithium material or a carbon powder (see col. 9.) Solid and gel electrolytes may be used in the cell (see col. 10.) Current collectors of stainless steel, copper and aluminum are noted in col. 9 and the examples. Polymer separators are noted in the examples. The active material may be the positive or negative electrode depending on the state of charge of the battery. The active material is mixed with conductive particles and attached to a current collector (see the examples.)

It would be obvious to one skilled in the art at the time the invention was made to prepare materials with nanometer sized particles as these methods are taught in the art as described. Further, it would be obvious to prepare electrodes with various thicknesses as the small particle sizes will allow for electrodes with an average thickness of less than about 10 microns, as taught in Dansui et al. (US 6,033,805.) One of ordinary skill in the art would have the knowledge to use the electrode materials of Kawakami et al. (US 6,165,642) in a thin electrode battery as taught by Dansui et al. (US 6,033,805) as it is clear that electrodes can be prepared with an average thickness of less than about 10 microns. In addition, one of ordinary skill in the art would have the knowledge to incorporate the thickness of the electrodes of Dansui et al. (US 6,033,805) into the thin battery of Kawakami et al. (US 6,165,642) as the small particles will allow for the production of a thin electrode with binders and conductive particles. The use of various current collectors would be obvious as each are well known in the art to conduct current from an electrode material. One of ordinary skill in the art would recognize that changing the relative dimensions of the electrode to a smaller size would give a smaller battery for use in small devices that require less energy (See MPEP 2144.04(d). It is well established in the art that adding less active material to an electrode will give an electrode with less capacity. The

artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claims 36 and 66 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dansui et al. (US 6,033,805) in view of Kawakami et al. (US 6,165,642) as applied above, and further in view of Miyasaka et al. (US 6,037,095.)

With regard to claims 36 and 66, Kawakami et al. (US 6,165,642) teaches the anode material may be a transition metal oxide, lithium material or a carbon powder. Kawakami et al. (US 6,165,642) does not specifically teach tin oxide as an anode material, however one of ordinary skill in the art would recognize that tin oxide is a well known transition metal oxide used as an anode in lithium secondary cells. For example, Miyasaka et al. (US 6,037,095) teaches a lithium ion secondary battery with a tin oxide anode or negative electrode (see claim 2.) It would be obvious to one skilled in the art at the time the invention was made to use tin oxide as the transition metal oxide anode material of Kawakami et al. (US 6,165,642) as tin oxide will allow for the equivalent transfer of electrons in the battery as the transition metal oxides of Kawakami.

Response to Arguments

Applicant's arguments have been fully considered in the examiner's answer, but are not persuasive for the reasons of record in the examiner's answer.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

Mark Ruthkosky
9/19/2005